

TEMPERATURE IN RELATION TO QUALITY OF SWEET CORN.

NEIL E. STEVENS and C. H. HIGGINS, *Journal of Agricultural Research*, September 15, 1919, Volume XVII, No. 6.

This paper refers to the reputation of sweet corn grown near the northern limits of cultivation, for sweetness and quality, as compared with that canned in more southern districts, and states that this difference is not due to a difference in sugar content of the corn when it is picked, but because of the lower temperature at harvest time.

It shows that sweet corn deteriorates very rapidly after it is picked, and that the rate of deterioration depends upon the temperature. Tests developed the fact that at a temperature of 20° C. (68° F.) corn lost from one-fourth to one-third of its total sugar, during the first 24 hours after picking, or more than twice as much as that kept at a temperature of 10° C. (50° F.). Also that kept at a temperature of 30° C. (86° F.) more than 50 per cent of the sugar was lost during the same period. The respiration is very high during the first day after corn is pulled from the stalk, and the rate increases with higher temperatures. "With corn at a temperature of 25° C. (picked near noon on a warm day) there was over 19 per cent carbon dioxide at the end of 4 hours. With corn at a temperature of 15° C. (picked in the morning) 8 hours were required to reach practically the same point, while with still cooler corn the point was not passed in 10 hours." In this connection it is pointed out that corn which had been kept for some time in an atmosphere deficient in oxygen was of extremely poor quality.

The authors called attention to the fact that the corn-picking season in Maryland is in August, when the daily average temperature (at Baltimore) is about 75° F., while the picking season in Maine is in September, when the average daily temperature (at Portland) is about 60°. Thus the deterioration of corn during a given period after picking would be much greater, in an ordinary packing season under the higher temperatures that prevail in Maryland than with the considerably cooler weather that obtains in Maine at harvest time.—*J. Warren Smith.*

CLIMATE AND WEATHER AND PLANT DISEASES.

The following extracted from the Plant Disease Bulletin Supplement No. 9, Bureau of Plant Industry, United States Department of Agriculture, shows the distribution of some plant diseases under the influence of climate, and the development as affected by different weather conditions:

"Apple Scab caused by *Venturia inaequalis* (Cke.) wint.—Favored by early and continued rains together with cool temperatures which prevailed over most of the eastern and central apple growing regions for about one month after the blooming period, apple scab, in 1919, appeared in many states with unprecedented severity and resulted in enormous losses.

"The main reason for this great outbreak of apple scab can be directly attributable to the unusual weather conditions in late April and during the month of May. The accumulation of scab during previous years was evidently a factor, but there was altogether too much rainy, cloudy, and damp weather during an entire month, beginning about the time the apple trees came into bloom. For example, the official Weather Bureau meteorological records at Washington, D. C., beginning April 24 and ending May 24, show only three periods with clear

weather—one clear day, April 24; two clear days, May 2 and 3; and two clear days May 18 and 19. During this period of 31 days, there were rains on 21 days, counting those in which a trace is recorded, and a trace is probably as effective on cloudy days as a heavier rain, not to mention the heavy dews with which the fruit and foliage were saturated on other cloudy days. Of the 21 days with rain, only 6 were marked 'partly cloudy,' which means that the sun shone through the clouds part of the time. The other 15 days were cloudy all day. Of the 10 days in which no rain fell, 5 only have already been accounted for as clear. Of the remaining 5 days, two were cloudy and 3 were partly cloudy.

"It is evident that there was almost a continuous infection period for 31 days, beginning when the apple trees were in bloom in the middle portion of this region, slightly preceding bloom in the northern sections, but following closely after bloom in the southern sections, and in general, occurring at the most dangerous period from the standpoint of apple scab. This is plainly the most important factor in the outbreak."

"Bitter rot caused by *Glomerella cinerula* (Stonem) S. & S.—Bitter rot is typically a disease of humid hot sections, extreme heat being especially favorable for its development. Those sections in which there are periods of extreme heat without appreciable temperature diminution at night with occasional showers or rainy periods are especially well situated for the development of bitter rot."—*J. W. Roberts.*

"Blotch caused by *Phyllosticta solitaria* E. & E.—Apple blotch, so far as known, occurs only in the Central and Southern States of the eastern half of the country. It has apparently not advanced beyond the northern borders of New Jersey, Pennsylvania, Ohio, Indiana, Illinois, and Iowa. One case was reported from a nursery in Wabasha County, Minn., in 1917, on imported nursery stock, but it is understood to have been eradicated. It is reported from a few localities in South Dakota, and is abundant in Nebraska, Kansas, Oklahoma, and Texas, but is not known to occur farther west."

"Rust caused by *Gymnosporangium juniperi-virginianae* Schw.—Apple rust is distributed over the Atlantic States from Maine to Georgia and extends westward as far as the outer boundaries of the nonirrigated apple belt. Extensive commercial production over this half of the country ceases at about the line of 18 inches annual precipitation, but rust is reported from scattered plantings practically up to the 100th meridian. It is not found in the irrigated districts, nor in the humid regions of the Pacific coast.

"In addition to the increase in the amount of infection, the unusual weather conditions of last spring, the excessive number of rainy and cloudy days occurring last spring, are undoubtedly an important factor in this outbreak."

"Black rot caused by *Physalospora cydoniae* Arnaud (*Sphaeropsis malorum* (Berk.) Pk.).—Black rot was reported by collaborators in 1919 from practically all apple growing regions in the eastern half of the United States, and also from Colorado and New Mexico. Greatest loss from this disease occurred in the States which lie east of the Mississippi and south of the Ohio and Potomac Rivers."

"Fire blight caused by *Bacillus amylovorus* (Burr.) Trevisan.—Fire blight occurred in 1919 in practically all States where the apple and pear are grown, but for the most part is perhaps the lightest infection of recent years. The group of States lying south of the Ohio and east of

the Mississippi, excepting Virginia and West Virginia, constitutes the only area reporting very severe losses to the apple crop from the disease in 1919."

"* * * This year in general there has been less pear blight in humid eastern United States than probably at any time previous to 1912. * * *"

"Powdery mildew caused by *Podosphaera leucotricha* (E. & E.) Salm.—Apple powdery mildew occurs from coast to coast and from the northern to the southern boundaries of the apple belt."

"In the irrigated districts the fungus depends upon the prevalence of dews for moisture for spore germination. First appearance of the disease is generally correlated with condition of full bloom, since infected buds that harbor the overwintering mycelium are delayed in opening until about this time."

"Sooty blotch caused by *Leptothyrium pomi* (Mont. & Fr.) Sacc.—Sooty blotch is widely distributed over the eastern half of the United States, or east of the 100th meridian. In 1919 Kansas reported 'Sooty blotch probably aided by wet season, very unusual for it to occur in Kansas.'"

"Drought spot (nonparasitic).—The term drought spot is used to refer to masses of dry corky tissue in the flesh of the apple. This trouble has been reported from various sections of Idaho where apples have been grown without irrigation and with insufficient moisture."

"Peach brown rot caused by *Sclerotinia cinerea* (Bon.) Schröt.—Brown rot was very prevalent in most of the peach States in the eastern half of the country during 1919. It was reported from all States where peaches are grown east of the 100th meridian and was present to some extent up and down the Pacific coast. (This disease affected plums and cherries over the same area.) Warm, moist weather is favorable for brown rot. Although collaborators did not report much about weather conditions, it is known that the wet weather at blossoming time in the Middle Atlantic States induced blossom blight in that section, and that the frequent summer rains favored the development of fruit rot in all the Eastern and Southeastern States."

"Scab caused by *Cladosporium carpophilum* Thüm.—Scab was reported from practically all peach States east of the one-hundredth meridian. It was common and widespread in most of these States and seemed to be of most importance in those in the South and East."

"Grape black rot caused by *Vitignardia bidwellii* (Ellis) V. & R.—This, the most serious disease of the grape, occurred widely over the entire eastern portion of the United States. It was most serious in the southern two-thirds of the country, where warm weather prevailed and where spraying is not generally practiced, and also

along the Atlantic coast, where the disease was favored further by abundant moisture."

The following from Bulletin No. 1, volume IV, dated July 15, 1920, indicate some effects of weather on plant disease in 1920:

"Wheat scab caused by *Gibberella saubinetii*.—Reports from some of the Eastern States, where wheat scab has been bad in certain other years, show that in those States the disease was much less prevalent on winter wheat than last year. This was probably on account of dry weather at heading time."

"Stem rust caused by *Puccinia graminis*.—If it should be warm and damp the spread will be rapid and early enough to be very destructive [North Dakota, July 8]."

"In Illinois (Anderson, May 21) apple scab appeared in the orchards about Urbana on May 16. This is quite late, but we have had very unusual weather this spring and it has been even too cold and rainy for apple scab."

"In Ohio black rot was developed noticeably in 1919 upon both twigs and fruit of apple following lime sulphur spray. The canker development upon twigs and branches is very prevalent. From present indications the cool moist weather conditions are leading to extensive infection of fruit and new growths."

"Peach leaf curl caused by *Exoascus deformans*.—Leaf curl was especially abundant this spring in some of the Middle Atlantic and Ohio Valley States. A cool, wet spring during bud opening doubtless favored the disease and also in some cases made it difficult to apply the dormant spray on time. In Illinois cold, rainy period throughout State this spring was probably the cause of unusual outbreak."

"Brown rot caused by *Sclerotinia cinerea*.—In Georgia, brown rot is present wherever fruit is not sprayed, but the dry weather appears to be holding it in check."

"Strawberry gray mold rot caused by *Botrytis* sp.—Gray mold rot is reported from Massachusetts, Connecticut, New Jersey, Ohio, Indiana, Illinois, Michigan (occasionally in Ingham County, no loss), Alabama (at Auburn), Louisiana, Texas, and California. Wet weather favored its development in Massachusetts, Ohio, and California."

"I am inclined to attribute this superabundance of *Botrytis* [in southern California strawberries, Jan.-Mar.] to the very large proportion of cold weather—that is, weather too cold for most fungi but fairly favorable to *Botrytis*. I am now at work on curves of hourly temperatures, and it is evident that during these months a large number of hours show temperatures of the kind mentioned. This or some other favorable conditions make *Botrytis* very common during even very dry weather."—J. Warren Smith.